

1 REMARKS

2 Status of the Claims

3 Claims 1-4, 6-19, and 28-30 are pending in the present application, Claims 5 and 20-27 having
4 been previously canceled as being directed to a non-elected invention in response to a Restriction, and
5 Claims 1, 15, 29, and 30 having been amended to more clearly define the invention.

6 Telephone Interview Summary

7 On August 29, 2007, applicants' attorney and Examiner Levkovich spoke briefly regarding a
8 proposed new claim (similar to Claim 1 as amended above), which was emailed to her earlier for her
9 informal consideration.

10 With respect to the new proposed claim, applicants' attorney pointed out that language relating
11 to the term "continuous" had been eliminated in the new claim in light of the Examiner's
12 35 U.S.C. § 112 rejection raised in the Office Action, dated May 31, 2007. Applicants' attorney also
13 pointed out the novelty of the steps being implemented by the controller, i.e., that the controller is
14 configured to ensuring that the fluid being discharged from the reactor comprises either the desired
15 chemical product or the solvent flush, as is schematically shown in applicants' FIGURE 4 (which
16 illustrates a substance library being sequentially created by the sequential reaction system of
17 FIGURE 1). Applicants' attorney then pointed out that Rosenberg's reaction module is controlled
18 differently, in that the fluid being discharged from Rosenberg's reactor, which generates oligomers
19 (long chain compounds including a plurality of amino acids that are added to the chain in a particular
20 order) includes reactants followed by a wash, followed by blocking or de-blocking agents as required,
21 followed by other reagents and washes/blocking/de-blocking agents; and finally produces a desired
22 product (an oligomer). Significantly, Rosenberg's controller implements steps (that result in a fluid
23 being discharged from the reactor) that are clearly different than the steps implemented by applicants'
24 system controller to discharge a fluid from the reactor in applicants' system.

25 Examiner Levkovich indicated that she understood the differences that applicants' attorney was
26 trying to point out, with respect to the proposed new independent claim. However, Examiner
27 Levkovich also inquired as to whether it was technically possible to prevent any product from being
28 discharged along with the solvent. The Examiner further indicated that she would need to consider the
29 impact of functional language in the claim, and discuss that issue with her Supervisor. Examiner
30

1 Levkovich also indicated that it would be acceptable for applicants' attorney to send an e-mail to her
2 addressing these issues (which applicants' attorney did later that day).

3 On September 19, 2007, Examiner Levkovich called and indicated that she had spoken with her
4 Supervisor, and that based on such discussions, the proposed claim did not appear to be patentable. The
5 information provided by Examiner Levkovich has led to the amendments and Remarks included herein,
6 which are believed to distinguish over the cited art.

7 Applicants' attorney would like to again thank Examiner Levkovich for her time and willingness to
8 discuss these issues during the telephone interview.

9 Distinguishing Features of the Present Invention

10 Applicants respectfully request that the Examiner consider the following features of
11 applicants' invention as defined by the independent claims presented herein, which distinguish over
12 the cited art for at least two reasons.

13 First, independent Claims 1, 15, and 29 as amended herein recite a controller that is
14 programmed to implement a novel sequence of steps, such that the chemical production system
15 functions in a manner distinguishable from that disclosed in the cited art. Specifically, the controller
16 ensures that the fluid being discharged from the reactor is either a desired product or a solvent that is
17 used to flush the reactor of any residual product, generally as illustrated in applicants' FIGURE 4. As
18 noted above, Rosenberg's system is controlled such that the fluid discharged from Rosenberg's
19 reactor is not simply either a product or a solvent flush.

20 Applicants appreciate the Examiner's concern that the solvent may actually include a trace
21 amount of product, which is correct. The purpose of the solvent is to prevent cross contamination
22 between different products (this point is clearly taught in the specification as filed). Applicants have
23 amended the claims to recite language that the solvent flush includes any residual product.

24 Second, Claims 28 and 30 (as well as dependent Claim 6) recite a structure that includes a
25 detector between a reactor outlet and a collection valve. The detector is specifically configured to
26 provide a signal indicative of whether the fluid being discharged from the reactor comprises the
27 solvent (as noted above it was understood at the time the application was filed that the solvent flush
28 may include residual product, but the small amount of product does not interfere with the detection of
29 the solvent being discharged – as opposed to one of the products). The controller is further
30 configured to use the signal from the detector to determine whether the collection (or output) valve

1 should be controlled to direct fluid from the reactor to a spent solvent reservoir, or instead, to an
2 automated product collector. While detectors are certainly known in the art, the art simply fails to
3 teach or suggest using a detector responsive to the presence of solvent to determine the correct
4 position of a valve, so that product may be collected separately from a solvent flush.

5 Functional Language

6 The Examiner is correct that the claimed structure relies at least in part on functional language
7 (i.e., the programming of the controller). Applicants respectfully submit that such functional
8 language cannot be ignored. MPEP 2173.05(g) clearly states that a functional limitation does not, in
9 and of itself, render a claim improper, and that a functional limitation must be evaluated and
10 considered, just like any other limitation of the claim, for what it fairly conveys to a person of
11 ordinary skill in the pertinent art in the context in which it is used.

12 In the current context, applicants define a controller (a structural component) that operates in
13 a novel manner as compared to controllers disclosed in the prior art. While it may be unusual to draft
14 a claim this way in the chemical arts area, there is nothing inherently improper about such a claim.
15 Indeed, in the computer arts, software related technology is typically claimed both as a method, and
16 as a system including a controller, processor, or other type of logic device that implements functions
17 that are generally consistent with the steps of the method. The controller in applicants' claims is
18 distinguished over other controllers or processors because it implements novel steps (in some cases,
19 the controller could be a custom circuit that is hardwired to implement specific novel functions, while
20 in other cases, the controller may be a general purpose processor that executes machine instructions
21 stored in the system, to implement novel functions that are generally consistent with the steps of the
22 method). In the context of the present application, both the controller and the step of controlling the
23 system so that *a fluid discharged from the reaction module substantially comprises either one of the*
24 *different desired chemical products or the solvent flush* appear to be well described. The
25 amendments to the claims are thus supported in applicants' specification.

26 Claims Rejected Under 35 U.S.C. §112

27 The Examiner has rejected Claims 1-4, 6-19 and 29 under 35 U.S.C. §112, first paragraph, as
28 failing to comply with the written description requirement. The Examiner explains that there is no
29 support for the language "continuous" flow of discharged products. The Examiner has also rejected
30 Claims 1-4, 6-19, 29 and 30 under 35 U.S.C. §112, second paragraph, as being unclear for failing to

1 particularly point out and distinctly claim the subject matter which applicants regard as the invention.
2 The Examiner explains that it is unclear whether the operation is directed toward a continuous or
3 periodical (cycle). The Examiner also explains that it is unclear what structural features of the
4 reactant supply distinguish it over the solvent supply.

5 With respect to the Examiner's rejection under the first paragraph of §112, applicants have
6 amended independent Claims 1, 15, and 29 such that they no longer recite "continuous flow of
7 discharged products/solvents."

8 With respect to the Examiner's rejection under the second paragraph of §112, applicants have
9 amended Claims 1, 15, 29, and 30 such that they clearly recite that the system is operated as required
10 to achieve the desired substance library (i.e., long enough to produce the substance library), thereby
11 avoiding introducing any confusion with respect to a period of time.

12 With respect to a solvent supply versus a reactant supply, while in some exemplary
13 embodiments, the reactant supply includes a plurality of separate chambers, while the solvent supply
14 need not include the plurality of chambers, both the reactant supply and the solvent supply are
15 configured to function as a reservoir for a material being used in the system. With respect to
16 structure, it is more important that any structure designated as a solvent supply and any structure
17 designated as a reactant supply be properly connected to other components in the system, than that
18 there be significant structural differences between the reactant supply and the solvent supply. Where
19 the reactant supply itself includes a plurality of separate chambers and the solvent supply does not,
20 there will be a structural difference between the two. Accordingly, applicants respectfully request,
21 that in view of the above amendments, the Examiner withdraw this rejection of the independent
22 Claims 1, 15, 29, 30 and their respective dependent claims.

23 Claims Rejected Under 35 U.S.C. §103

24 The Examiner has rejected Claims 1-9, 11-16, and 18-19 and 28-30 under 35 U.S.C § 103(a) as
25 being obvious over Rosenberg (WO009300625).

26 The Examiner has further rejected Claims 10 and 17 as being unpatentable over Rosenberg in
27 view of Joslyn (U.S. Patent No. 6,656,423).

28 In the interest of reducing the complexity of the issues for the Examiner to consider in this
29 response, the following discussion focuses on independent Claims 1, 15, 29, and 30. The patentability of
30 each remaining dependent claim is not necessarily separately addressed in detail. However, applicants'

1 decision not to discuss the differences between the cited art and each dependent claim should not be
2 considered as an admission that applicants concur with the Examiner's conclusion that these dependent
3 claims are not patentable over the disclosure in the cited references. Similarly, applicants' decision not to
4 discuss differences between the prior art and every claim element, or every comment made by the
5 Examiner, should not be considered as an admission that applicants concur with the Examiner's
6 interpretation and assertions regarding those claims. Indeed, applicants believe that all of the dependent
7 claims patentably distinguish over the references cited. Moreover, a specific traverse of the rejection of
8 each dependent claim is not required, since dependent claims are patentable for at least the same reasons
9 as the independent claims from which the dependent claims ultimately depend.

10 Patentability of Independent Claims 1, 15, and 29

11 Significant differences exist between the recited subject matter and the cited art because
12 Rosenberg does not teach or suggest a controller configured to ensure that a fluid discharged from the
13 reactor comprises either a desired chemical product or a solvent flush.

14 As explained above in connection with applicants' remarks under the Interview Summary, the
15 cited art does not teach or suggest a controller configured to manipulate the elements of a sequential
16 production system such that a fluid discharged from the reactor in the sequential production system
17 comprises either a desired product in a library of products, or a solvent flush (applicants' FIGURE 4
18 schematically illustrates such a fluid discharge). The automated sequential reaction system disclosed
19 by Rosenberg generates oligomers (long chain organic compounds, such as DNA, comprising a
20 plurality of distinct subunits, such as amino acids, that have been assembled in a particular sequence).
21 Synthesizing a single oligomer requires attaching the first amino acid (A) to a substrate in the
22 reaction vessel, then flushing the reaction vessel to remove any unbound initial amino acid (A), then
23 adding a second amino acid (B) to the reaction vessel to achieve the sequence A-B, then flushing the
24 reaction vessel to remove any unbound initial amino acid (B), and repeating the preceding steps with
25 other amino acids, until the desired oligomer is achieved. During the process disclosed by
26 Rosenberg, the fluid exiting the reaction vessel is a reactant (R) followed by a solvent flush (S), so
27 that the discharged fluids are in the sequence: R-S-R-S-etc. Finally, the product (P) is released (R-S-
28 R-S...-P). Furthermore, in addition to the reactant and solvent that is discharged from the reaction
29 vessel, blocking and de-blocking agents may also be required and will also be flushed from the
30 reactor. Clearly, the sequence of fluids being discharged from the reaction vessel disclosed by

1 Rosenberg is not equivalent to applicants' recitation that indicates a product (P) is followed by a
2 solvent (S). Rosenberg does not disclose or suggest the applicants' sequence of fluids, P-S-P-S-P-S.

3 Structurally, the controller disclosed and recited by applicants is also distinguishable from the
4 controller disclosed by Rosenberg. Because functional limitations are acceptable so long as the
5 functional limitation is sufficiently clear to be understood by an artisan of ordinary skill in the art, the
6 current rejection does not provide a *prima facie* case of obviousness, since it does not recognize the
7 difference between the cited art and the functionality recited in applicants' claims. To support a
8 *prima facie* case of obviousness, it will be necessary to either provide a prior art reference including
9 an equivalent controller (i.e., a controller configured to implement equivalent functional steps), or to
10 explain why an artisan of ordinary skill in the art would have been motivated to modify the controller
11 disclosed by Rosenberg to achieve an equivalent controller. Absent the impermissible application of
12 hindsight, there does not appear to be a reasonable basis for an artisan of ordinary skill in the art to so
13 dramatically modify the steps implemented by Rosenberg's controller to achieve what is recited by
14 applicants' claims.

15 Accordingly, the cited art does not teach or suggest all of the recitation of applicants' Claims
16 1, 15, and 29 as amended herein, and these claims are patentable over the cited art. In addition,
17 Claims 2-14, and 16-19 depend from Claims 1 and 15, and since dependent claims inherently include
18 all that is recited in the independent claim from which they ultimately depend, Claims 2-14, and 16-
19 19 are patentable for at least the same reasons as noted above in regard to their independent claims.
20 Thus, the rejection of Claims 1-19 and 29 should be withdrawn.

21 Patentability of Independent Claims 28 and 30; and Dependent Claim 6

22 Significant differences exist between the recited subject matter and the cited art because there
23 is no suggestion or motivation in the cited art or in the knowledge generally available to one of
24 ordinary skill in the art to modify Rosenberg to include an automated detector and a controller
25 configured to utilize a signal from the automated detector to control the position of a valve
26 downstream from the reactor outlet, to direct solvent to a spent solvent reservoir and product to a
27 product reservoir.

28 The Examiner asserts that although Rosenberg does not specifically teach a detector located
29 between the reaction chamber and the output valve, that it would have been obvious to one of
30 ordinary skill in the art at the time of the invention to have placed a detector at the reactor outlet, in

1 the modified apparatus of Rosenberg, *in order to control the process of product formation*.
2 Applicants respectfully submit that the scope of the phrase *to control the process of product*
3 *formation* is unclear. If the Examiner is asserting that it would have been obvious to employ
4 detectors in Rosenberg's system in the same manner that detectors have been employed in other
5 chemical production systems, that assertion would only be a basis for rejecting applicants' claims if
6 there were some logical connection between Rosenberg's process and the function of the prior art
7 detector. There does not seem to be such a logical connection. Accordingly, it is entirely unjustified
8 to assert that the use of *any detector* for *any purpose* would have been obvious, without citing a
9 reference that teaches or suggests using a detector in an equivalent manner. Applicants' use of a
10 detector and the function that it performs, as recited in applicants' claims, is clearly not taught nor
11 obvious in view of the teaching of Rosenberg.

12 In the context of the present claims, applicants' disclosure clearly teaches that because the
13 flow rates and volumes of the sequential reaction system are known quantities, the position of the
14 valve at the reactor output can be controlled without the use of a detector (see the third paragraph on
15 page 16 of the specification as filed). The specification further teaches that an enhanced control of
16 the outlet valve's position can be obtained by employing flow sensors in place of the recited detector.
17 The specification finally teaches that a detector that can differentiate between the product and the
18 solvent can be beneficial when the volumes of product are relatively low and the value of the product
19 is relatively high.

20 With respect to Rosenberg, it appears that the valve position is controlled based on known
21 system parameters (system volume and known flow rates). The cited art does not teach or suggest
22 that control of the reactor in this manner is undesirable for any reason and does not teach or suggest
23 that any other approach might provide an advantage. There is no indication that the cited art
24 recognized that incorporation of a detector and controller configured to control the position of a valve
25 based on the detector signal (indicating whether a solvent was present at the detector) would provide
26 a benefit. It is not logical to increase system complexity without a recognition of a specific benefit
27 that such a modification would achieve.

28 Without providing a reference that teaches or suggests using a detector and a controller (i.e.,
29 an equivalent structure) to achieve an equivalent function, or providing evidence that an artisan of
30 ordinary skill would have recognized an obvious benefit associated with the required modification to

1 Rosenberg's system, the modification required to achieve an equivalent invention appears to
2 impermissibly rely on hindsight. Accordingly, the rejection of independent Claims 28 and 30, and
3 dependent Claim 6 should be withdrawn.

4 Based upon the amendment to the claims and the remarks presented above, all of the claims now
5 submitted define patentable subject matter that is neither anticipated nor obvious in view of the prior art
6 cited. The Examiner is thus requested to pass the present application to issue. If there are any questions
7 that might be addressed by a telephone interview, the Examiner is invited to telephone the undersigned
8 attorney, at the number listed below.

9 Respectfully submitted,

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12 Michael C. King
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